

B³ cont.
type of pigment and wherein the electrophile is selected from the group consisting of: acyl azides, isocyanates, ketones, aldehydes, anhydrides, amides, imides, imines, α,β -unsaturated ketones and aldehydes, alkyl halides, epoxides, alkyl sulfonates and sulfates, aromatic compounds which undergo addition-elimination reactions, and salts and derivatives thereof.

B⁴
40.(Amended) A method of making a modified pigment comprising reacting a pigment having attached a first chemical group with a second chemical group to form said pigment having attached at third chemical group, wherein the second chemical group comprises at least one nucleophilic group which reacts with the first chemical group to form the third chemical group, and said first chemical group comprises an alkylsulfate group.

REMARKS

Pending Claims

Claims 1, 30, 38, and 40 have been amended as shown above to more clearly describe what Applicants regard as the invention. Support for these amendments can be found throughout the specification. In particular, support for the amendment of claim 1 is found in Table 1 on page 8. Support for the amendments of claims 30 and 38 is found on page 10, lines 10-15 and in the Examples, as well as in Table 1 on page 8. Support for the amendment to claim 40 is found, for example, on page 3, lines 26-29 and page 7, lines 1-6. No new matter has been added. Claims 1, 5-25, 30-35, and 38-42 are pending.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "MARKED VERSION OF CHANGES TO THE CLAIMS."

Summary of the Invention

The present application, in general, relates to methods of making a modified pigment by reacting a pigment having attached a first chemical group with a second chemical group to form said pigment having attached a third chemical group, as well as the modified pigments themselves. Ink compositions, in particular, inkjet ink compositions are also disclosed.

Rejection of Claims Under 35 U.S.C. § 112

Claim 9-11, 30-33 and 38-39

The Examiner has rejected the above-identified claims as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In paragraph 3(a) of the Office Action, the Examiner states that claim 9 recites that the second chemical group comprises polymer such as polyalkylene oxide, polyol, and polyacrylate and claim 1, from which claim 9 ultimately depends, as amended, recites that the second chemical group comprises organic group selected from the group consisting of acyl azides, isocyanates, etc. The Examiner states that the scope of claim 9 is confusing because it is not clear what the second chemical group comprises, asking if the second chemical group comprises both polymer as recited in claim 9 and organic group as recited in claim 1. The Examiner requests clarification.

Applicants believe that claim 9 is clear as written. According to claim 1, the second chemical group comprises an organic group selected from a specified list of groups. According to claim 8, the second organic group comprises a polymer, and claim 9 recites specific types of polymers. Therefore, the second chemical group in claim 9 comprises both an organic group and a polymer of the types disclosed. This is further described in the specification on page 7, lines 7-15 and page 9, lines 21-31. Therefore, Applicants believe that claim 9 is not indefinite and respectfully request that the rejection be withdrawn.

In paragraph 3(b) of the Office Action, the Examiner states that claims 30 and 38 recite that the organic group is the "reaction product of at least one electrophile and a nucleophilic polymer; and an acylating agent" and, due to the presence of the semi-colon, states that it is not clear if or how the acylating agent reacts with the electrophile and nucleophilic polymer. The Examiner suggests rewriting the above phrase to "reaction product of at least one electrophile and a nucleophilic polymer which is then further reacted with an acylating agent" as consistent with the present specification.

Applicants would like to thank the Examiner for this helpful suggestion. While Applicants believe that claims 30 and 38 are clear as written, Applicants have amended these claims as suggested in the Office Action.

Applicants believe that claims 9-11, 30-33, and 38-39 are not indefinite and respectfully request that the rejection of these claims be withdrawn.

Rejection of Claims Under 35 U.S.C. § 102

Claims 1, 5, and 8-13

The Examiner has rejected the above-identified claims as being anticipated by Moffatt et al. (U.S. Patent No. 6,221,932). In paragraph 5 of the Office Action, the Examiner incorporates the rejection set forth in paragraph 5 of the Office Action mailed October 16, 2001, and, in paragraph 15, further states that Moffatt et al. discloses attaching a first chemical group to the pigment wherein these groups include those comprising aromatic groups. The Examiner also states that, in Moffatt et al., this first chemical group is then reacted with second chemical group, i.e., polymer which includes polyethyleneimine, which the Examiner states clearly contains the organic group recited in claim 1, i.e., imine. The Examiner concludes that Moffatt et al. does disclose organic groups as presently claimed. Applicants respectfully disagree.

As amended, claim 1 of the present application relates to a method of making a modified pigment comprising reacting a pigment having attached a first chemical group with a second chemical group to form a pigment having attached a third chemical group. The first chemical

group, the second chemical group, and the third chemical group each comprises at least one organic group selected from the group consisting of: acyl azides, isocyanates, ketones, aldehydes, anhydrides, amides, imides, imines, α,β -unsaturated ketones and aldehydes, alkyl halides, epoxides, alkyl sulfonates and sulfates, amines, hydrazines, thiols, hydrazides, oximes, carbanions, aromatic compounds which undergo addition-elimination reactions, and salts and derivatives thereof.

In comparison, Moffatt et al. describes the reaction of modified pigments which comprise an aromatic ester group or activated ester group. One skilled in the art would recognize that these aromatic groups are not the types that under addition-elimination reactions, as recited in claim 1. Instead, these aromatic groups undergo nucleophilic substitution or acylation reactions (see column 4, lines 35-39). The groups identified by Moffatt et al. are shown in the diagram spanning columns 4 and 5. Therefore, these are not the aromatic groups disclosed in amended claim 1. While the polymer group disclosed in Moffatt et al. may be a polyethyleneimine and therefore may comprise a group included in the list of claim 1 of the present invention (which would be an amine group rather than the imine group noted by the Examiner), Moffatt et al. does not disclose the reaction of a first chemical group with a second chemical group wherein each comprises a group selected from those specified in claim 1.

Therefore, Applicants believe that claim 1, as well as claims 5 and 8-13, which are directly or indirectly dependent from claim 1 and are further distinguishable over the cited reference, are not anticipated by Moffatt et al. and respectfully request that the rejection be withdrawn.

Claims 1, 5, 8-9, 12, and 14-19

The Examiner has rejected the above-identified claims as being anticipated by PCT Publication No. WO 99/31175. In paragraph 6 of the Office Action, the Examiner incorporates the rejection set forth in paragraph 7 of the Office Action dated October 16, 2001, and, in paragraph 15 further states that WO 99/31175 discloses a method of making a modified pigment comprising reacting carbon black pigment which has an attached organic group which has an

attached ionic or ionizable group with at least one polymer which attaches to the ionic or ionizable group. The Examiner also states that the organic group includes aromatic group or amide group, the ionic group includes sulfonates and amines, and the polymer is, for instance, obtained from amide group. The Examiner concludes that, given that these organic groups disclosed in WO 99/31175 are the same as those disclosed in the present claim 1, WO 99/31175 does disclose organic groups as presently claimed. Applicants respectfully disagree.

As amended, claim 1 of the present application relates to a method of making a modified pigment comprising reacting a pigment having attached a first chemical group with a second chemical group to form a pigment having attached a third chemical group. The first chemical group comprises at least one electrophile and said second chemical group comprises at least one nucleophile, or vice versa. The first chemical group, the second chemical group, and the third chemical group each comprises at least one organic group selected from the group consisting of: acyl azides, isocyanates, ketones, aldehydes, anhydrides, amides, imides, imines, α,β -unsaturated ketones and aldehydes, alkyl halides, epoxides, alkyl sulfonates and sulfates, amines, hydrazines, thiols, hydrazides, oximes, carbanions, aromatic compounds which undergo addition-elimination reactions, and salts and derivatives thereof.

In comparison, WO 99/31175 describes three types of modified carbon products and methods for preparing them. Applicants believe that none of these modified carbon products are prepared using the method described in the present application.

One type of modified carbon product is one having attached at least one organic group, monomeric group, or polymeric group (see page 5, lines 13-15). These may be prepared by a diazonium attachment method (see, for example, page 6, line 26 to page 7, line 11). While WO 99/31175 details many types of organic groups, polymeric groups, and monomeric groups, there is no teaching or suggestion in WO 99/31175 of reacting any of these attached groups with a second chemical group. Therefore, the first type of modified carbon product does not anticipate the method of the above-identified claims.

A second type of modified carbon product disclosed in WO 99/31175 is a carbon product having attached a group having the formula $-\text{Ar}-\text{CO}_2-\text{R}$, wherein R is an organic group,

monomeric group, or a polymeric group (see page 15, lines 18-24). These may be prepared by a method which involves the esterification reaction of modified pigments comprising an aromatic acid group (see page 15, line 25 to page 16, line 6 and the diagram therein as well as Example 3). However, these are not the groups disclosed in claim 1. Specifically, an aromatic acid group would not be recognized by one skilled in the art as an aromatic group which undergoes addition-elimination reactions. Therefore, the second type of modified carbon product does not anticipate the method of the above-identified claims.

Finally, the third type of modified carbon product disclosed in WO 99/31175 is a carbon product having attached a) at least one organic group directly attached to the carbon product, b) at least one ionic group, ionizable group, or mixture thereof attached to the organic group, and c) at least one counter-ionic or counter-ionizable group with at least one organic group, monomeric group, or polymeric group. The counter-ionic or counter-ionizable group is attached to the ionic or ionizable group (see page 16, lines 8-13). These can be prepared by a method which involves the exchange of a counter-ionizable group (see page 16, line 27 to page 17, line 23 and the diagram therein). However, these are not the groups disclosed in claim 1. Specifically, the groups disclosed in WO 99/31175 would not be recognized by one skilled in the art as being electrophilic and nucleophilic groups, as disclosed in the present application. Rather these are ionic or ionizable groups which undergo counterion exchange. No electrophilic/nucleophilic reaction is disclosed in relation to this type of modified product. Therefore, the third type of modified carbon product does not anticipate the method of the above-identified claims.

Therefore, Applicants believe that claims 1, as well as claims 5, 8-9, 12, and 14-19 which are directly or indirectly dependent from claim 1 and are further distinguishable over the cited reference, are not anticipated by WO 99/31175 and respectfully request that the rejection be withdrawn.

Claims 21-22, 24, 34-35, and 40-41

The Examiner has rejected the above-identified claims as being anticipated by Moffatt et al. '257 (U.S. Patent No. 6,323,257). In paragraph 7 of the Office Action, the Examiner states

that Moffatt et al. '257 disclose modified pigment and ink jet ink comprising modified pigment wherein the modified pigment has attached at least one directly attached organic group which is the reaction product of (2-sulfatoethyl)-sulfone group and at least one nucleophilic polymer such as polyalkylene glycol. The Examiner concludes that Moffatt et al. '257 anticipates the present claims. Applicants respectfully disagree.

Regarding claims 21, 22, and 24, claim 21 of the present application relates to a modified pigment having attached at least one organic group, wherein said organic group comprises: the reaction product of at least one (2-sulfatoethyl)-sulphone group and at least one nucleophilic polymer. Contrary to the Examiner's comments, Moffatt et al. '257 does not disclose this type of modified pigment. Instead, Moffatt et al. '257 clearly teaches a modified pigment which is reaction product of a polymerization reaction with the attached reactive groups. For example, column 6, lines 7-9 teaches that the presence of the attached reactive groups allows the polymerization reaction to occur in water. A variety of suitable polymerization reactions are taught at column 6, lines 13-15. Most importantly, Moffatt et al. '257 clearly states the reaction is a radical chain polymerization that occurs at the reactive group (see column 6, line 15-18). This is further supported by the extensive list of radical-polymerizable monomers which can be used (column 6, line 27 to column 16, line 16). These would not be recognized by one skilled in the art as nucleophilic polymers. In particular, the specific polymer cited by the Examiner in the Office Action is also not a nucleophilic polymer. Rather, column 6, line 30-31 describes this as an alkylene glycol "derived from acrylic and methacrylic acid" which is a radical-polymerizable monomer and not a nucleophilic polymer. Therefore, this is not the nucleophilic group of present claim 21. Applicants believe that the claims 21, as well as claims 22 and 24, which are dependent from claim 21 and are further distinguished over the cited reference, are not anticipated by Moffatt et al. '257.

Regarding claims 34-35, claim 34 relates to an ink composition comprising a liquid vehicle and a modified pigment, wherein the modified pigment comprises a pigment having attached at least one organic group, wherein said organic group comprises: the reaction product of a pigment having attached at least one (2-sulfatoethyl)-sulphone and at least one nucleophilic polymer. For

the reasons discussed in more detail above, contrary to the Examiner's comments, Moffatt et al. '257 does not disclose this type of ink composition. The modified pigment of Moffatt et al. '257 is not the reaction product of a nucleophilic polymer. Rather, Moffatt et al. '257 teaches that the reaction is a radical chain polymerization that occurs at the reactive group. Therefore, Applicants believe that claim 34, as well as claim 35 which is dependent from claim 34 and is further distinguished over the cited reference, is not anticipated by Moffatt et al. '257.

Finally, regarding claims 40-41, claim 40, as amended, relates to a method of making a modified pigment comprising reacting a pigment having attached a first chemical group with a second chemical group to form said pigment having attached at third chemical group, wherein the second chemical group comprises at least one nucleophilic group which reacts with the first chemical group to form the third chemical group, and said first chemical group comprises an alkylsulfate group. For the reasons discussed in more detail above, this is not the method of Moffatt et al. '257. No nucleophilic reaction is taught or suggested in this reference. Instead, Moffatt et al. '257 teaches that the reaction is a radical chain polymerization that occurs at the reactive group, which does not involve a nucleophilic group as recited in claim 40. Applicants therefore believe that claim 40, as well as claim 41 which is dependent from claim 40 and is further distinguishable over the cited reference, is not anticipated by Moffatt et al. '257.

Therefore, Applicants believe that claims 21, 22, 24, 34-35, and 40-41 are not anticipated by Moffatt et al. '257 and respectfully request that this rejection be withdrawn.

Rejection of Claims under 35 U.S.C. § 103(a)

Claims 23 and 42

The Examiner has rejected claims 23 and 42 as being unpatentable over Moffatt et al. '257 (U.S. Patent No. 6,323,257). In paragraph 9 of the Office Action, the Examiner states that Moffatt et al. '257 discloses the use of phenyl (2-methyl ethyl sulfonato) sulfone, which contains a methyl substituent not present in the instantly claimed invention. The Examiner further states that, given the similarity between the claimed compound and that disclosed by Moffatt et al.

'257, and given that the compound of Moffatt et al. '257 is used as a first chemical group on a pigment which is then reacted with a second chemical group, it would have been natural for one of ordinary skill in the art to infer that the presently claimed compound is just an obvious variant of that in Moffatt et al. '257. Applicants respectfully disagree.

Regarding claim 23, this claim depends from independent claim 21 which discloses a modified pigment comprising a pigment having attached at least one organic group, wherein said organic group comprises the reaction product of at least one (2-sulfatoethyl)-sulphone group and at least one nucleophilic polymer. For the reason discussed in more detail above, contrary to the Examiner's comments, the compound of Moffatt et al. '257 is not used as a first chemical group which is then reacted with a second chemical group as disclosed in the present invention. Instead, Moffatt et al. '257 clearly teaches a polymerization reaction of the attached reactive groups and specifically states that the reaction is a radical chain polymerization that occurs at the reactive group (see column 6, line 15-18). Thus, while the first chemical group of Moffatt et al. '257 may be structurally similar to the phenyl (2-sulfatoethyl)-sulphone group of claim 23, the second chemical group of Moffatt et al. '257 is not a nucleophilic polymer as in claim 23. In addition it would not be obvious to replace the reactive monomers with a nucleophilic polymer since the reaction types are completely different.

Claim 42 ultimately depends from independent claim 40. As amended, claim 40 recites a method for making a modified pigment comprising reacting a pigment having attached a first chemical group with a second chemical group to form said pigment having attached at third chemical group, wherein the second chemical group comprises at least one nucleophilic group which reacts with the first chemical group. For the reasons discussed in more detail above, the second chemical group of Moffatt et al. '257 is not a nucleophilic polymer as in claim 42, and it would not be obvious to use a nucleophilic polymer in place of the reactive monomers since the reactions are completely different.

Therefore, Applicants believe that claims 23 and 42 are patentable over Moffatt et al. '257 and respectfully request that this rejection be withdrawn.

Claim 25

The Examiner has rejected claim 25 as being unpatentable over Moffatt et al. '257 (U.S. Patent No. 6,323,257) in view of Moffatt et al. (U.S. Patent No. 6,221,932). In paragraph 10 of the Office Action, the Examiner states that, in light of the motivation for using specific type of polymer disclosed by Moffatt et al., it would have been obvious to one of ordinary skill in the art to use such polymer in the pigment of Moffatt et al. '257 in order to produce an ink with increased smearfastness, enhanced print quality, and improved bleed control, and thereby arrive at the claimed invention. Applicants respectfully disagree.

Claim 25 of the present application relates to a modified pigment having attached at least one organic group comprising the reaction product of at least one (2-sulfatoethyl)-sulfone group and at least one nucleophilic polymer, wherein the nucleophilic polymer is polyethyleneimine or derivatives or salts thereof. For the reasons discussed in more detail above, Moffatt et al.'257 does not relate to the use of nucleophilic polymers but rather to the radical polymerization of attached reactive groups. Also, Moffatt et al teaches a nucleophilic substitution or acylation reaction of an attached aromatic ester group or activated ester group. These are completely different types of reactions, and one skilled in the art would not be motivated to combine the teachings of Moffatt et al. 257 with those of Moffatt et al. Even if one were to combine these references, this would not result in the method of claim 25. Instead, one would attempt to use the polymer types disclosed in Moffatt et al. also in a radical polymerization reaction as taught in Moffatt et al. '257.

Therefore, Applicants believe that claim 25 is patentable over Moffatt et al. '257 in view of Moffatt et al. and respectfully request that this rejection be withdrawn.

Claims 1, 5-9, and 12

The Examiner has rejected claims 1, 5-9, and 12 as being unpatentable over Moffatt et al. '257 (U.S. Patent No. 6,323,257) in view of WO 99/31175. In paragraph 11 of the Office Action, the Examiner states that WO 99/31175 discloses attaching chemical groups to carbon black using diazonium salt and that this reaction can occur in a variety of reaction conditions and

in any type of reaction medium, and is compatible with a variety of functional groups. The Examiner concludes that it would have been obvious to one of ordinary skill in the art to use diazonium salt to attach the first chemical group to the pigment of Moffatt et al. '257, and thereby arrive at the claimed invention. The Examiner also states that Moffatt et al. '257 discloses the use of phenyl (2-methyl ethyl sulfonato) sulfone, which contains a methyl substituent not present in the instantly claimed invention. The Examiner further concludes that, given the similarity between the claimed compound and that disclosed by Moffatt et al. '257, and given that the compound of Moffatt et al. '257 is used as a first chemical group on a pigment which is then reacted with a second chemical group, it would have been natural for one of ordinary skill in the art to infer that the presently claimed compound is just an obvious variant of that in Moffatt et al. '257. Applicants respectfully disagree.

Regarding claim 1, as amended, this claim relates to a method of making a modified pigment comprising reacting a pigment having attached a first chemical group with a second chemical group to form a pigment having attached a third chemical group. The first chemical group comprises at least one electrophile and said second chemical group comprises at least one nucleophile, or vice versa. For the reasons discussed in more detail above, Moffatt et al. '257 does not teach or suggest the method of claim 1 since it does not teach an electrophilic/nucleophilic reaction. Instead, Moffatt et al. '257 teaches a radical polymerization reaction that occurs at the reactive group. Furthermore, even if one of ordinary skill in the art were to use a diazonium salt, as taught in WO 99/31175, to attach the first chemical group to the pigment of Moffatt et al. '257, one would not arrive at the present invention since the groups described in Moffatt et al. '257 are not those of claim 1, which comprise an electrophilic group or a nucleophilic group. Therefore, Moffatt et al., either individually or in combination with WO 99/31175, does not claim and describe Applicants' invention.

Furthermore, as described in more detail above, while the first chemical group of Moffatt et al. '257 may be structurally similar to the phenyl (2-sulfatoethyl)-sulphone group of the present application, the second chemical group of Moffatt et al. '257 does not comprise at least one electrophile or nucleophile, as in the present claims. In addition it would not be obvious to

replace the reactive monomers with a second chemical group comprising an electrophile or a nucleophile since the reaction types are completely different.

Therefore, Applicants believe that claim 1, as well as claims 5-9 and 12 which are directly or indirectly dependent from claim 1 and are further distinguishable over the cited references, are patentable over Moffatt et al. '257 in view of WE 99/31175, and respectfully request that this rejection be withdrawn.

Claims 10-11

The Examiner has rejected claims 10-11 as being unpatentable over Moffatt et al. '257 in view of WO 99/31157 as applied to claims 1, 5-9, and 12 above, and further in view of Moffatt et al. (U.S. Patent No. 6,221,932). Applicants presume the Examiner is referring to WO 99/31175 rather than WO 99/31157 discussed in paragraph 12 of the Office Action, and clarification is requested. The comments which follow are based on this presumption.

In paragraph 12 of the Office Action, the Examiner states that, Moffatt et al. discloses attaching polymer such as polyamine and polyethyleneimine to pigment in order to produce an ink with increased smearfastness, enhanced print quality, and improved bleed control, and further discloses the equivalence and interchangeability of polyalkylene glycols, as disclosed in Moffatt et al. '257, with polyethyleneimine. The Examiner concludes that, in light of the motivation for using specific type of polymer disclosed by Moffatt et al., it would have been obvious to one having ordinary skill in the art to use such polymer in the pigment of Moffatt et al. '257 in order to produce an ink with increased smearfastness, enhanced print quality, and improved bleed control, and thereby arrive at the claimed invention. Applicants respectfully disagree.

Claims 10 and 11 of the present application depend from claim 1 and relate to a method of making a modified pigment comprising reacting a pigment having attached a first chemical group with a second chemical group to form said pigment having attached a third chemical group. The first chemical group comprises at least one electrophile and said second chemical group comprises at least one nucleophile, or vice versa. Claims 10 and 11 disclose that the second chemical group is either a polyamine or a polyethyleneimine. For the reasons discussed

in more detail above, Moffatt et al. '257 does not teach or suggest the method of claims 10 or 11.

This reference does not relate to the use of nucleophilic polymers but rather to the radical polymerization of attached reactive groups. Also, Moffatt et al teaches a nucleophilic substitution or acylation reaction of an attached aromatic ester group or activated ester group. These are completely different types of reactions, and one skilled in the art would not be motivated to combine the teachings of Moffatt et al. 257 with those of Moffatt et al. Even if one were to combine these references, particularly using the disclosure of WO 99/31175 to attach the first chemical group, this would not result in the method of claims 10-11. Instead, one would attempt to use the polymer types disclosed in Moffatt et al. also in a radical polymerization reaction as taught in Moffatt et al. '257.

Therefore, Applicants believe that claims 10-11 are patentable over Moffatt et al. '257 in view of WO 99/31175 as applied to claims 1, 5-9, and 12 above, and further in view of Moffatt et al. and respectfully request that the rejection be withdrawn.

Claims 1, 5, 8-9, 12, 14-15, 20, 30-33, and 38-39

The Examiner has rejected claims 1, 5, 8-9, 12, 14-15, 20, 30-33, and 38-39 as being unpatentable over Ikeda et al. (U.S. Patent No. 5,952,429) in view of WO 99/31175. In paragraph 13 of the Office Action, the Examiner states that Ikeda et al. disclose a method of making a modified pigment comprising reacting a carbon black pigment which comprises an electrophilic functional group with polymer which comprises a nucleophilic reactive group and further discloses that this product is then further reacted with an additional organic group such as succinic anhydride. The Examiner also states that WO 99/31175 discloses attaching chemical groups to carbon black by using diazonium salts and discloses that this method is used given that diazonium salt can react with carbon black in a variety of reaction conditions and in a variety of reaction medium and further given that diazonium salt is compatible with a wide variety of functional group. The Examiner concludes that, in light of this, it would have been obvious to one of ordinary skill in the art to use diazonium salt to attach the first chemical group to the

pigment of Ikeda et al. and thereby arrive at the claimed invention. Applicants respectfully disagree.

Regarding claims 1, 5, 8-9, 12, and 14-15, claim 1 of the present application relates to a method of making a modified pigment comprising reacting a pigment having attached a first chemical group with a second chemical group to form a pigment having attached a third chemical group. The pigment having attached a first chemical group is prepared by reacting a diazonium salt having the first chemical group with at least one type of pigment to form said pigment having attached a first chemical group. Ikeda et al. teaches a method of preparing a carbon black graft polymer by reacting a carbon black with a polymer having a reactive group capable of reacting with a functional group on the surface of the carbon black. The carbon black is required to have a functional group such as a carboxyl group or a hydroxyl group (see column 16, lines 34-38). These are carbon blacks known in the art as acidic carbon blacks and are referred to as such in column 16, lines 44-48. These are not the electrophilic or nucleophilic groups disclosed in claim 1 of the present application. Furthermore, Ikeda et al. does not disclose reacting a pigment having attached a first chemical group prepared by reacting a diazonium salt having the first chemical group with at least one type of pigment. Therefore, Applicants believe that Ikeda et al. does not disclose the method of claim 1.

WO 99/31175 describes three types of modified carbon products and methods for preparing them. However, for the reasons discussed in more detail above, Applicants believe that none of these modified carbon products are prepared using the method described in the present application. Specifically, WO 99/31175 does not teach or suggest the reaction of any of the attached electrophilic or nucleophilic groups included in present claim 1. Of the three types of modified pigments disclosed in WO 99/31175, only the second type mentions a pigment prepared by the reaction of an electrophilic group and a nucleophilic group, and none of these groups are those disclosed in claim 1. Therefore, Applicants believe that WO 99/31175 also does not disclose the method of the present invention.

Furthermore, if one skilled in the art were motivated to combine these references, this would still not produce the method of the present invention. If combined, one skilled in art

would use the diazonium salt method of WO 99/31175 to attempt to attach carboxyl or hydroxyl groups, as taught in Ikeda et al. There is no teaching or suggestion in Ikeda et al. to use any other types of reactive groups. Again, these types of groups are not those disclosed in claim 1 of the present application. Applicants therefore believe that claim 1, as well as claims 5, 8-9, 12, and 14-15 which are directly or indirectly dependent from claim 1 and are further distinguishable over the cited references, are patentable over Ikeda et al. in view of WO 99/31175.

Claim 20 of the present application relates to the method of making a modified pigment as described above, further comprising reacting the third chemical group attached to the pigment with at least one additional second chemical group and, in particular, succinic anhydride. While Ikeda et al. does disclose that the resulting carbon black graft polymer may be further reacted with an acid anhydride (column 42, lines 6-13), for the reasons discussed in more detail above, these are not the modified pigments of the present invention. In addition, Ikeda et al. in combination with WO 99/31175 would not result in the method disclosed in claim 20. As discussed in more detail above, combining these references would lead one to use a diazonium method to attempt to attach carboxyl or hydroxyl groups to a pigment as taught in Ikeda et al., and these are not the electrophilic/nucleophilic groups disclosed in claim 20. Applicants therefore believe that claim 20 is patentable over Ikeda et al. in view of WO 99/31175.

Regarding claims 30-33 of the present application, claim 30, as amended, relates to a modified pigment having attached at least one organic group, wherein said organic group comprises the reaction product of at least one electrophile and a nucleophilic polymer which is then further reacted with an acylating agent, wherein the organic group is attached by reacting a diazonium salt having the electrophile with at least one type of pigment. The electrophile is selected from the group consisting of: acyl azides, isocyanates, ketones, aldehydes, anhydrides, amides, imides, imines, α,β -unsaturated ketones and aldehydes, alkyl halides, epoxides, alkyl sulfonates and sulfates, aromatic compounds which undergo addition-elimination reactions, and salts and derivatives thereof. For the reasons discussed in more detail above, Ikeda et al. does not disclose the modified pigment of the present invention. In particular, this reference does not teach or suggest the electrophiles of claim 30. In addition, as discussed above, the combination

of Ikeda et al. with WO 99/31175 would also not produce the modified pigment of claim 30. Rather, combining these references would lead one to use a diazonium method to attach carboxyl or hydroxyl groups to a pigment as taught in Ikeda et al. and these are not the electrophiles of claim 30. Applicants therefore believe that claim 30, as well as claims 31-33 which are dependent from claim 30 and are further distinguishable over the cited references, are patentable over Ikeda et al. in view of WO 99/31175.

Regarding claims 38-39 of the present application, claim 38, as amended, relates to an ink composition comprising a liquid vehicle and a modified pigment, wherein the modified pigment comprises a pigment having attached at least one organic group, wherein said organic group comprises: the reaction product of at least one electrophile and a nucleophilic polymer which is then further reacted with an acylating agent, wherein the organic group is attached by reacting a diazonium salt having the electrophile with at least one type of pigment. The electrophile is selected from the group consisting of: acyl azides, isocyanates, ketones, aldehydes, anhydrides, amides, imides, imines, α,β -unsaturated ketones and aldehydes, alkyl halides, epoxides, alkyl sulfonates and sulfates, aromatic compounds which undergo addition-elimination reactions, and salts and derivatives thereof. For the reasons discussed in more detail above, Ikeda et al. does not disclose the ink composition of the present invention. In particular, this reference does not teach or suggest the electrophiles of claim 38. In addition, as discussed above, the combination of Ikeda et al. with WO 99/31175 would also not produce the ink composition of claim 38. Rather, combining these references would lead one to use a diazonium method to attach carboxyl or hydroxyl groups to a pigment as taught in Ikeda et al. and these are not the electrophiles of claim 38. Applicants therefore believe that claim 38, as well as claim 39 which is dependent from claim 38 and is further distinguishable over the cited references, are patentable over Ikeda et al. in view of WO 99/31175.

Therefore, Applicants believe that claims 1, 5, 8-9, 12, 14-15, 20, 30-33, and 38-39 are patentable over Ikeda et al. in view of WO 99/31175 and respectfully request that the rejection be withdrawn.

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Conclusion

In view of the foregoing remarks, Applicants believe that this application is considered to be in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would further expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

By: Michelle B. Lando
Michelle B. Lando
Reg. No. 33,941
CABOT CORPORATION
Law Department
157 Concord Road
Billerica, MA 01821-7001

Date: January 16, 2003
Attorney Docket No.: 99097CIP

MARKED VERSION OF CHANGES TO THE CLAIMS

IN THE CLAIMS

Please amend the claims as follows:

1.(Twice Amended) A method of making a modified pigment comprising reacting a pigment having attached a first chemical group with a second chemical group to form said pigment having attached a third chemical group, wherein the second chemical group reacts with the first chemical group to form the third chemical group, and said first chemical group comprises at least one electrophile and said second chemical group comprises at least one nucleophile, or vice versa, wherein said pigment having attached a first chemical group is prepared by reacting a diazonium salt having the first chemical group with at least one type of pigment to form said pigment having attached a first chemical group, and wherein the first chemical group, the second chemical group, and the third chemical group each comprises at least one organic group selected from the group consisting of: acyl azides, isocyanates, ketones, aldehydes, anhydrides, amides, imides, imines, α,β -unsaturated ketones and aldehydes, alkyl halides, epoxides, alkyl sulfonates and sulfates, amines, hydrazines, thiols, hydrazides, oximes, carbanions, aromatic compounds which undergo addition-elimination reactions, and salts and derivatives thereof.

30.(Twice Amended) A modified pigment comprising a pigment having attached at least one organic group, wherein said organic group comprises: the reaction product of at least one electrophile and a nucleophilic polymer[; and] which is then further reacted with an acylating agent, wherein the organic group is attached by reacting a diazonium salt having the electrophile with at least one type of pigment, and wherein the electrophile is selected from the group consisting of: acyl azides, isocyanates, ketones, aldehydes, anhydrides, amides, imides, imines, α,β -unsaturated ketones and aldehydes, alkyl halides, epoxides, alkyl sulfonates and sulfates,

aromatic compounds which undergo addition-elimination reactions, and salts and derivatives thereof.

38.(Twice Amended) An ink composition comprising a liquid vehicle and a modified pigment, wherein the modified pigment comprises a pigment having attached at least one organic group, wherein said organic group comprises: the reaction product of [a pigment having attached] at least one electrophile and a nucleophilic polymer[; and] which is then further reacted with an acylating agent, wherein the organic group is attached by reacting a diazonium salt having the electrophile with at least one type of pigment, and wherein the electrophile is selected from the group consisting of: acyl azides, isocyanates, ketones, aldehydes, anhydrides, amides, imides, imines, α,β -unsaturated ketones and aldehydes, alkyl halides, epoxides, alkyl sulfonates and sulfates, aromatic compounds which undergo addition-elimination reactions, and salts and derivatives thereof..

40.(Amended) A method of making a modified pigment comprising reacting a pigment having attached a first chemical group with a second chemical group to form said pigment having attached at third chemical group, wherein the second chemical group comprises at least one nucleophilic group which reacts with the first chemical group to form the third chemical group, and said first chemical group comprises an alkylsulfate group.